High
Efficiency
Solutions.

CAREL

News from Chillventa

Since 1973, CAREL has been producing electronic control solutions and humidification systems.

From the control of the units to the services for the plants, the needs keep changing and CAREL, with its innovative solutions, is the ideal partner to support your offer.

New efficiency frontier
Water loop, variable speed compressors and EEVs work together for you

The new control solution to improve energy efficiency in the food and retail market and to reduce the environmental impact.

To increase the efficiency of systems in food retail applications, CAREL has developed, tested and made available an innovative control solution using variable speed compressors controlled by inverter, electronic expansion valves and technological integration between the refrigeration and air-conditioning systems. The refrigeration system comprises cabinets each fitted with variable speed BLDC compressor controlled by inverter, proportional electronic expansion valve and anti-sweat heaters modulation for maximum energy optimisation.

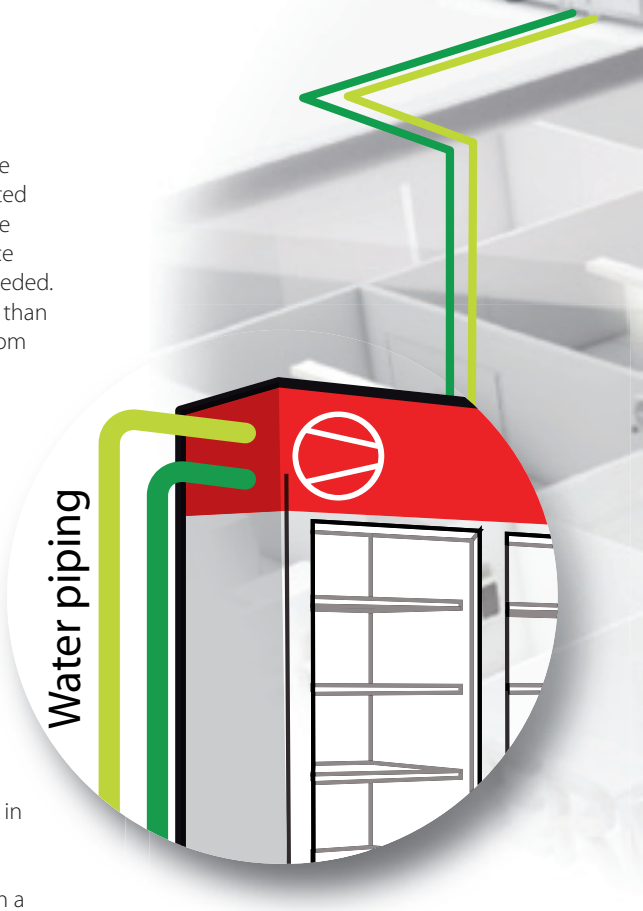
This solution offers the advantage of optimised evaporation temperature (the highest possible) on each cabinet, in turn meaning maximum cooling efficiency and less frequent and faster defrosts.
Moreover, thanks to the temperature control precision through inverter and proportional expansion valve, the correct food storage temperature is granted.

The condensation in refrigerated display cabinets and the dissipation of the heat generated by the inverters are done using a condenser and heat sink attached to a water loop.
Compared to similar solutions with plug-in refrigerated units, the water condensation does not emit heat into the store, preventing having to dispose of it at the expense of the air conditioning system.
The absence of dissipation fans on the inverter increases its reliability and makes maintenance easier.

Also, by providing the plant with an adequate heat pump system, all of the condensation heat from the refrigerated display cases (and dissipation from the inverters) can be recovered to produce sanitary hot water and heat where needed.
Where the heat requirements are less than that provided by the condensation from the refrigerated display cases, a free cooling chiller system helps achieve excellent plant performance for any outdoor temperature between -10 and 45°C. The use of BLDC compressors with inverters and electronic expansion valves in the heat pump leads to significant savings as well as considerable plant flexibility.
In fact, the system is able to simultaneously delivery heating and cooling capacity with high adjustment ranges by also taking advantage of the inverter technology in the pumping control units.

Compared to a traditional system with a compressor rack, the refrigerant charge will be significantly lower, with the same cooling capacity, indirectly benefiting the environment.
Since the unit is assembled and tested in the factory and not in the field, as occurs in a traditional system, the possibility of refrigerant leaks is also reduced. If a leakage occurred, it would be limited to the contents of a single display case and not the entire system.

The ease of installation for the entire system is a key feature. No piping brazing is required in the field, just the simple positioning of the display cases, which can be easily modified over time, and connection to the water loop using simple plastic piping.
This results in reduced installation and maintenance costs.



Energy efficiency

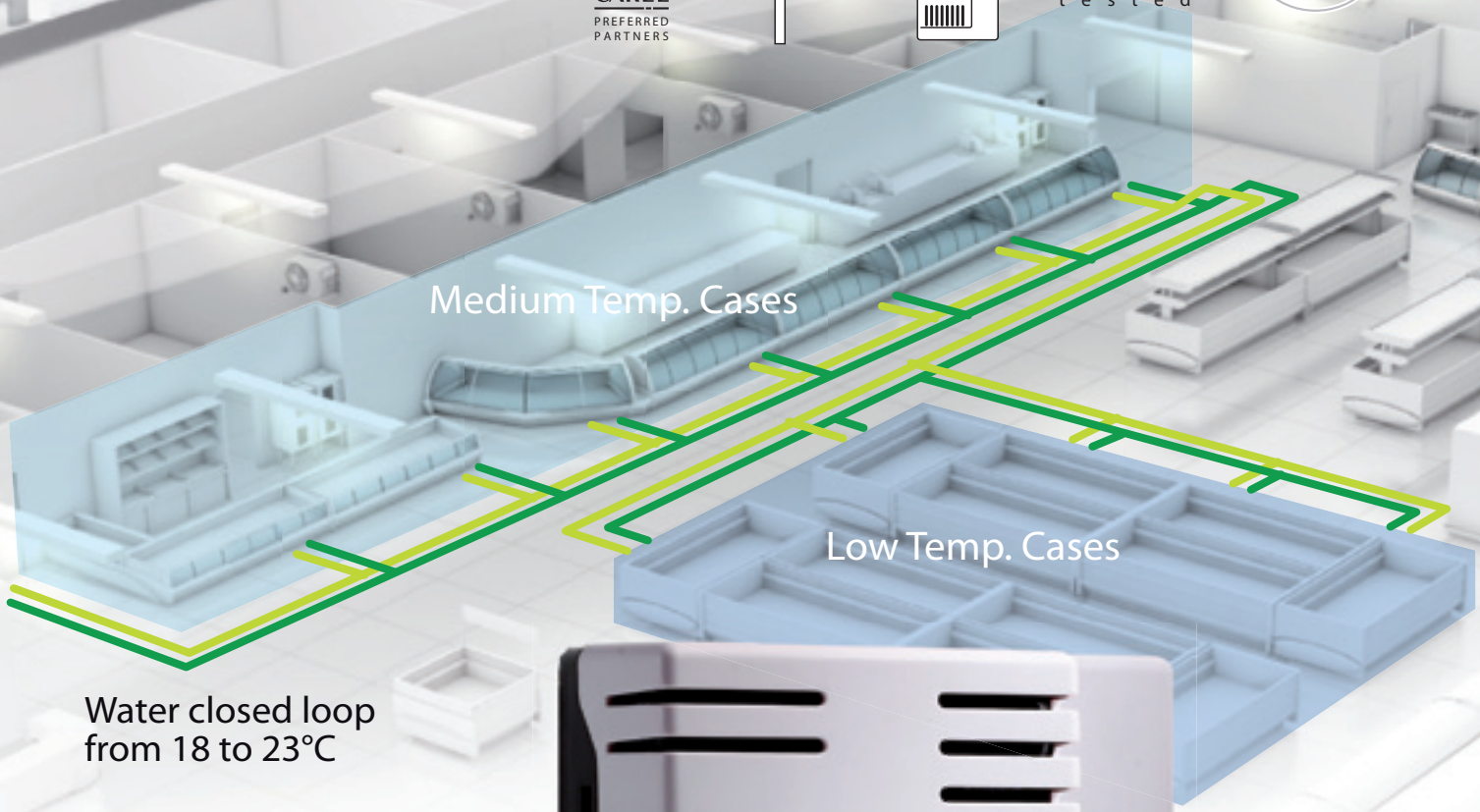
- Independent cabinets = optimised individual performance
- Highest evaporation temperature and reduced defrost demand
- Efficient heat recovery from water loop

Environmental impact reduction

- Limited refrigerant charge
- Minimised leakage risk as 100% of units are factory tested

Chiller with free cooling coil

DC Technology
CAREL PREFERRED PARTNERS
eXV sistema
power+ speed drive
OEM factory tested
water loop



Water closed loop
from 18 to 23°C

Reliability

- Out of service limited to each independent refrigerated unit
- Less dependence on mechanical equipment due to free cooling circuit

Easy installation and maintenance

- No copper fittings or brazing: all piping is made from plastic
- Easy repositioning of cabinets even after installation
- The water loop system with cold plate CAREL inverter reduces maintenance
- The condensing unit is reduced in size thanks to the cold plate CAREL inverter

power+
cold plate version

CAREL retail sistema
Integrated solutions for energy savings in retail

CAREL retail sistema uses the most innovative plant solutions to maximise the energy savings and manage low environmental impact

CAREL retail sistema allows complete control and monitoring of the site and the various sub-systems in more complex superstores, efficiently managing alarms and supervision and supplying the users with solutions that allow:

- energy saving and management of consumption;
- reduction of environmental impact via compatibility with the most recent system solutions;
- optimisation of management and installation times via specific vertical functionality for this market.

In CAREL philosophy, the various area controllers allow maximum integration of the different accessories and therefore maximum usability and performance: unique user interface, unique adjustment software in the various applications and complete management through system supervision.

pLoads: the ideal partner for energy supervision and control

pLoads is the innovative CAREL controller for intelligent management of energy consumption; it significantly reduces waste, with considerable cost savings for the end user.

Main benefits and features:

- Scheduling of connected loads
- Load cut-off
- Multiple energy meter and consumption management

ECO - HVAC package

CAREL can today provide customers four plug-ins for reducing supermarket energy consumption. HVAC-ECO is available with the Carel PlantVisorPRO supervisory system..

Compressor rack solutions

pRack pR300 Cutting edge modular solution for compressor racks with energy saving features. pR300T Subcritical and Transcritical CO_2 system controller platform evolution.

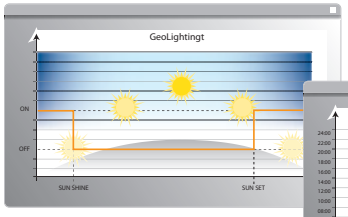
NEW

Chillbooster

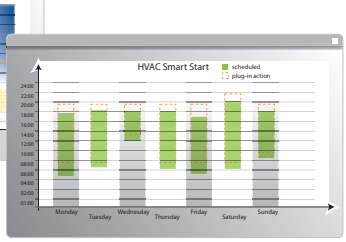
Evaporative cooling: Boosts condenser and gascooler efficiency.

Leakage sensor

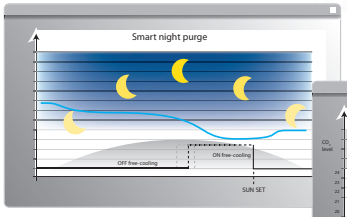
Refrigerant gas leak detector



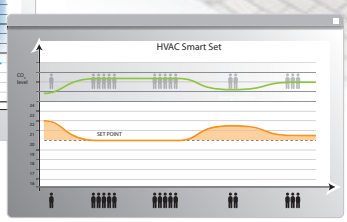
GeoLighting:
sunshine and sunset calculated by latitude and longitude



HVAC Smart Start
the air-conditioning system scheduler is optimised by the value of enthalpy and system inertia



Smart night purge
lower night-time temperatures are used to decrease the heat load of the supermarket, reducing the air-conditioning pre-start time



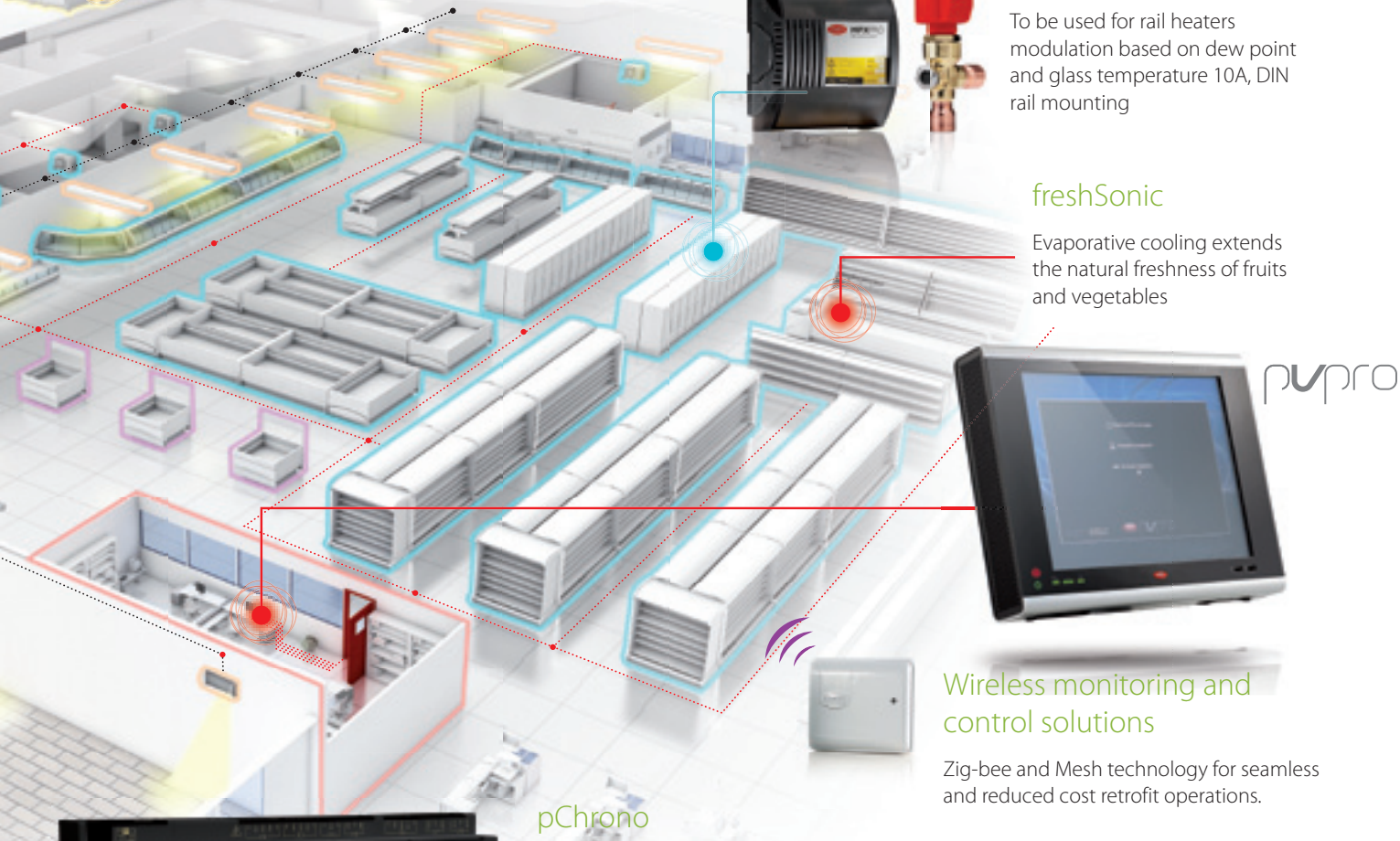
HVAC Smart Set
the algorithm optimises the temperature set point inside the supermarket according to building occupancy

Air conditioning solutions

Leading and comprehensive range for roof-top units, air handling units, chillers and heat pumps. Scalable solutions according to application complexity.
Evaporative cooling technology.
Geothermal technologies.

Show case solutions

MPXPRO Control solution for display cabinets, cold rooms and embedded management of Electronic Expansion Valves.
EXV sistema Full range of Proportional Expansion Valves both for conventional and CO_2 refrigerant.



Solid State Relay

To be used for rail heaters modulation based on dew point and glass temperature 10A, DIN rail mounting

freshSonic

Evaporative cooling extends the natural freshness of fruits and vegetables

Wireless monitoring and control solutions

Zig-bee and Mesh technology for seamless and reduced cost retrofit operations.

pChrono

The ideal partner for managing lighting and non-food devices

pChrono is the innovative CAREL controller for managing supermarket lights. It can also be used to manage other loads that require precise and customised scheduling. pChrono is completely integrated into the PlantVisorPRO supervisory system.

Main benefits and features:
Lighting management
- Scheduled device management
- Pump management
- 10A power socket management
- Universal functions

MPXPRO

Complete solution for management of multiplexed refrigeration units

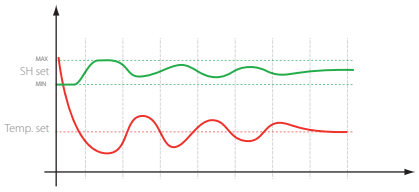
Continuous modulation now also available for commercial refrigeration at more competitive costs

MPXPRO step3 provides the benefits of continuous refrigerant modulation for the same total cost and with the same simple installation as old PWM technology, no longer used in air-conditioning applications for several years now.
All without limits, complications or additional components! Smooth Line control.

- Energy saving: MPXPRO offers various possibilities for optimising the operation of a showcase or cold room and bringing high energy savings. In addition to traditional techniques for optimising defrosts and day-to-day management.
- Usability: Complete functions and specific commissioning tools make the device easier to use and configure, above all during setup.
- Performance: Innovative and highly flexible algorithms mean MPXPRO can meet the most frequent market demands.

Smooth Lines control

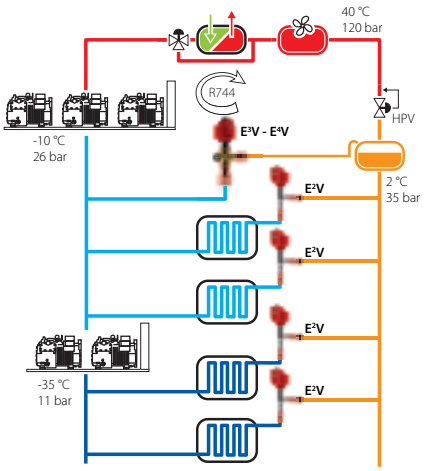
New electronic expansion valve control that optimises evaporator management, continuously modulating capacity, so as to ensure maximum stability of showcase operation. Together with the new "smart rack set" algorithm, this helps save a further 5% in total system energy consumption.



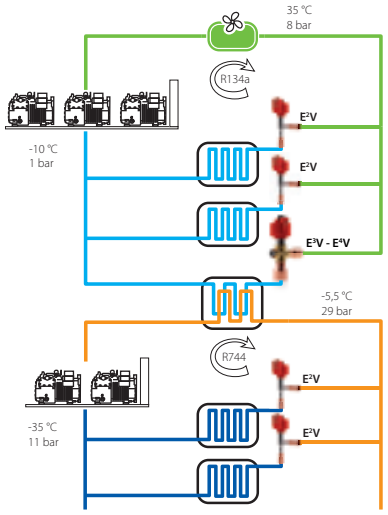
I/O configurability

Probes can freely be assigned to different functions for maximum flexibility and cost reduction in your applications.

Advanced solutions for CO_2 compressor racks



Booster transcritical CO_2
pRack pR300T



Cascade subcritical CO_2
pRack pR300

Just one platform for managing CO_2 systems. Flexibility and scalability to meet all requirements.

pRack is the complete CAREL offering for control and management of centralise compressor racks.
The ideal solution for meeting many different market requirements, with features that include :

- high number of inputs and outputs for control functions;
- innovative per energy saving management algorithms;
- compatibility with the main market control standards;
- ample integration/supervision options

New pRack pR300 and pR300T version with up to 2 EEV driver and ultracap technology built in or serial communication with external driver.

- Faster and more powerfull HW platform
- Modbus® third parties devices integration
- Full compatibility with existing pRack solutions
- USB connection for easy and fast commissioning

EEVS: Electronic Expansion Valves Synchronisation

Advanced synchronization between cascade heat exchanger electronic expansion valves and compressor rack controller.

- EEV autoadjustment for compressors couplings
- EEV working settings modulation for CO_2 condensing pressure
- High CO_2 condensing pressure safety protection

Monitoring system and energy saving logic

Refrigeration, air-conditioning and lights integrated into one system, offering better control, more safety and optimised energy consumption.

PlantVisorPRO is the CAREL monitoring and supervision system to completely control and optimize the refrigeration and air conditioning plants.
It offers an intuitive and customizable user interface to configure and display the status of the plant.
PlantVisorPRO guarantees the remote access to all the devices connected through LAN or MODEM connection.
The system is available as a complete all-in-one solution: the product combines all the connections to the filed, digital inputs and output relays.

Full Site Management

Easy configuration and complete control using a simple and attractive interface.

Refrigeration Energy Optimisation

Technology and intelligent installation management to optimise energy costs relating to cooling.
Automatic management of compressor rack floating suction pressure set point based on demand from the cabinets.
Intelligent anti-sweat heaters activated according to indoor temperature and humidity.

Energy Management

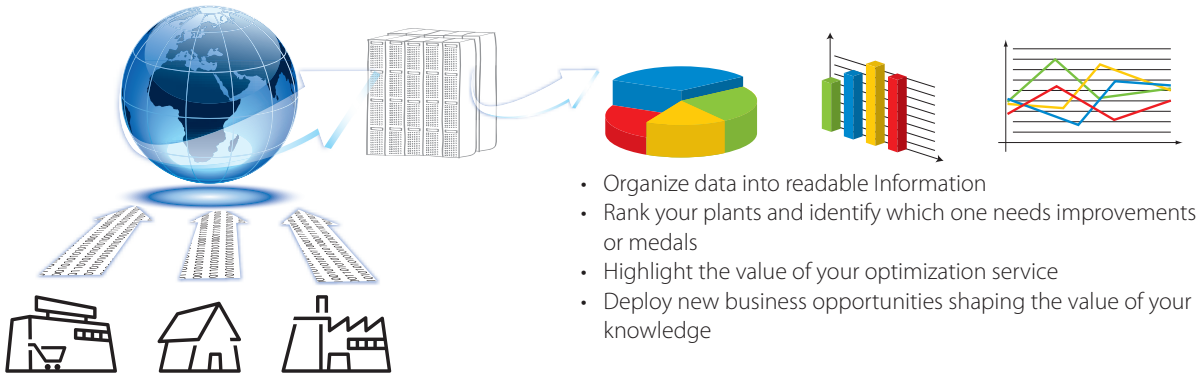
Lower energy consumption with minimum system configuration.
Real time management to cut-off loads based on actual consumption.
Lights switched on/off without requiring human intervention.

Simplified Commissioning

Reduction of the plant installation time and of the installation control thanks to the thermodynamic debug and to the possibility to spread the parameter configuration.

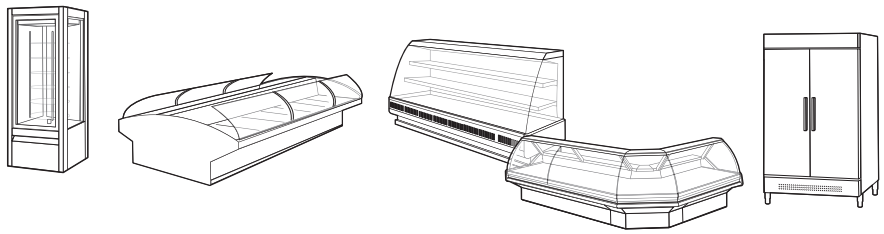
remotepro

No longer individual systems, rather an increasingly intelligent and interconnected network for acquiring data and using the information acquired to create new business opportunities.



- Organize data into readable Information
- Rank your plants and identify which one needs improvements or medals
- Highlight the value of your optimization service
- Deploy new business opportunities shaping the value of your knowledge

F.I.T. your style!
Food service solutions



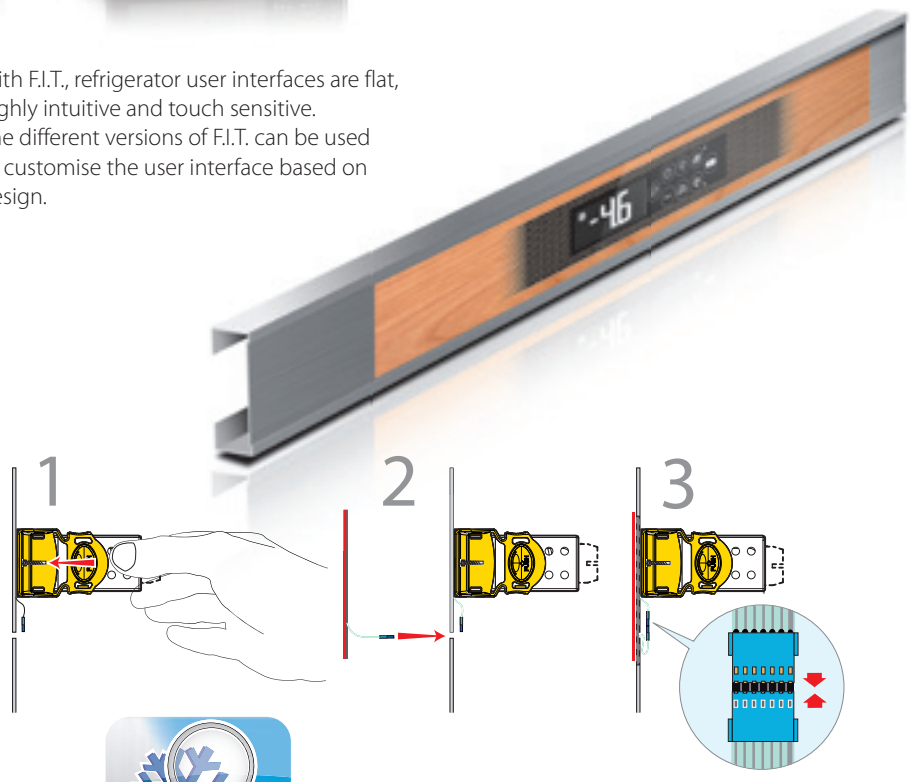
Flat • Intuitive • Touch
The appearance is extremely simple, intuitive and very appealing, developed with a completely flat surface for easy cleaning and much better hygiene.

ir33+, ir33+ wide and easy wide, evolutions of the ir33 and powercompact families. These are the ideal solution for showcases, display cases and refrigerated cabinets in the catering, ice cream, patisserie, bar and restaurant markets.

The new ir33+ range of controllers fulfils the main needs required of refrigeration controllers: a simple appearance, extremely intuitive yet highly attractive, featuring a completely flat surface that makes it easy to clean and ensures an excellent level of hygiene, in complete compliance with HACCP standards.
ir33+ features a new interface. The ON/OFF function and an alarm icon have been added, and the buzzer can be muted directly.
The keypad is touch sensitive.

CAREL presents F.I.T. technology (Flat, Intuitive, Touch) for modern refrigeration applications.

With F.I.T., refrigerator user interfaces are flat, highly intuitive and touch sensitive.
The different versions of F.I.T. can be used to customise the user interface based on design.



QuickFinder

CAREL presents QuickFinder, the selection tool for refrigeration applications.
This has been designed and developed for distributors and installers, with the following objectives:

- To provide a useful contribution in the field, when product information is needed during installation or maintenance.
- To offer a tool for selecting the most suitable solution: starting from the application, the App suggests the most suitable product.
- To offer a CAREL alternative to other products available on the market, using a table with complete comparison of compatible instruments.

Ethernet™ box

where an Internet connection is already available, all tERA services can be activated by simply connecting an Ethernet cable.

- **Plug&play solution:** no static IP address, no router configuration
- **Secure connection:** SSL-encrypted data transmission

connect • collect • process

CAREL has created a new platform of services using the latest technology available on the market and widely used in other applications: the concepts of the internet of things, smart machines, cloud computing, wireless connectivity, smartphone and tablet applications are making inroads into the HVAC/R market in a completely new way.
Global market trends are focusing on service proposals, and the servitization process is already underway. In this scenario, customers no longer want an individual product, nor even a system solution, but rather require a complete service proposal.
Every link in the supply chain needs to help add global value for the end user. The first step in providing an advanced service proposal in the HVAC market is creation of the network. Connectivity is now standard for all users, however still far from reality for HVAC systems. There are already several solutions available for remote access to individual units, however a global platform for sharing information across a network and processing the data acquired is something new. Now a centralised remote management system can be created for HVAC applications, starting from the new tERA platform.
All it takes to access this new world is a simple subscription: you can find everything you need to enhance your offering with services that carry high added value.
Users will have interfaces optimised for analysis via PC, smartphone or tablet. The platform can also transfer information to mobile Apps customised with the user's own interface.

Connect

Connectivity to your system is simple and immediate, via the unique identification code assigned. You can freely choose which communication channel to use during installation: the platform can either use Wireless GSM or an Ethernet line, with secure and reliable solutions.

Collect

This solution adapts to all need: you can start with analysis of just a few sites or choose to compare data from thousands of systems, with increasingly detailed information.

Process

Access to the information acquired is simple and intuitive. Reports and graphs on data and alarms let you quickly assess unit operating status and immediately make any required changes to parameters, so as to improve operation using the same remote connection, or plan specific actions to be performed from the office.

tService

tService is the CAREL application to be used by site maintenance personnel for accessing the tERA service platform.
This App is a useful monitoring tool that helps local service technicians have information on their systems available at all times.

lect

GPRS box

a ready to use connection independent of local infrastructure

- **Plug&Play solution:** SIM card already included
- **Secure connection:** private channel in cellular network (VPN)

pCO5+ blue line

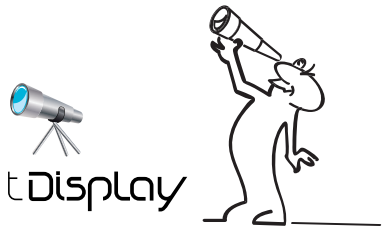
the new generation controller integrates all tERA services, no external connection box needed

- **Plug&Play solution:** connect through any Internet router, no configuration needed; unique identification number (Tera ID) to easily manage your own devices

connect • collect • process

Simple and fast access to all the information;
optimise your work and become more competitive;
offer your customers a cutting-edge proposal

tService acquires the information with a simple click: minor configuration problems can therefore be resolved directly from the office, wherever you are. For more serious problems, fast data analysis lets you know what action needs to be taken.



tDisplay is used to control systems over a remote connection. A basic application with customisable interface lets users monitor site data and modify settings as if they were actually standing in front of their unit.

tTrace provides advanced graphs to compare all the main system parameters. It can be used to check site operation before and after updating the configuration, thus easily highlighting the advantages of the new settings.

tDisplay

tDisplay is used to access the new tERA platform to control one or more systems. Maximum possibility to customise descriptions of systems, lines and devices with text, photographs and geolocation services, plus simple modification of configuration parameters via remote are just some of this App's innovative features.

Solution for high efficiency heat pumps

Integrated management of DC inverter compressors and the electronic expansion valve ensures very high energy savings.

-30%

The CAREL solution for the control of high efficiency ground source heat pumps ensures significant energy savings in the entire system, guaranteeing a high degree of adaptability and integration between heat generator and system.

Management of variable speed compressors with DC inverters, together with the use of the electronic expansion valve in fact allows the widest heat output modulation capacity currently available, maximising performance of the unit in response to the changing thermal loads and climatic conditions throughout the year. The added possibility of exploiting serial communication to control smart actuators (pumps, fans...) represents a further step forwards in the development of more reliable and efficient heat pumps.

With Smart HP, CAREL offers ready-to-use application software that integrates all the options provided by pCOsistema+, including:

- water and room set point control
- residential heating and domestic hot water (DHW)
- outside temperature compensation
- management of inverter-driven compressors
- management of CAREL electronic expansion valves (CAREL EXV sistema)
- dedicated room terminal.

EC Technology CAREL PREFERRED PARTNERS

DC Technology CAREL PREFERRED PARTNERS

CAREL Preferred partners

The close collaboration with high level technological partners let you develop more and more innovative solutions.

Higher Seasonal Performance Factor with DC Inverter technology

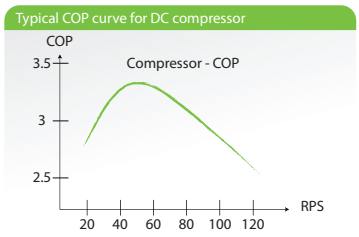
power+ is a special inverter that can control compressors with permanent magnet brushless motors (BLDC/BLAC) Integrated into pCOsistema+, it brings significant energy savings by modulating compressor speed and consequently unit cooling capacity. Variations in load are managed precisely and with constant control of the compressor envelope. This makes significant increases in unit COP possible during operation at part load, giving higher seasonal performance factor values (SPF).

Advantages:

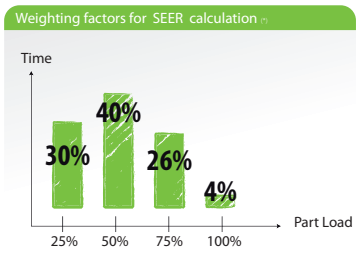
- Higher Seasonal Performance Factor with DC Inverter technology
- Improved system efficiency thanks to precise modulating load management
- Wide range of modulation (achievable from 20 rps up to 120 rps)
- Significantly increased COP at part load conditions (see graph)
- More stable water temperature and precise control, thus requiring smaller or no water tank
- Less need for defrosting in ASHP units

thanks to higher evaporator temperature at low capacity

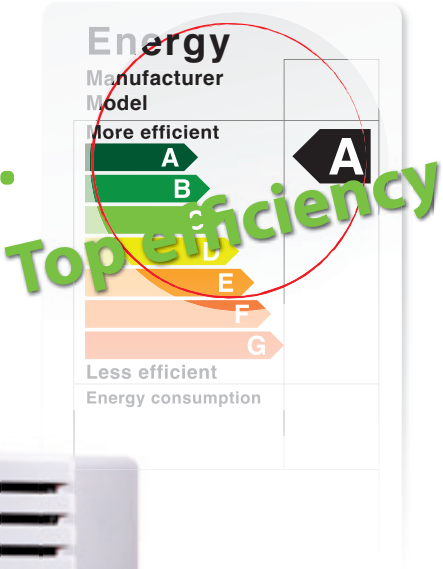
- Peak load management with smooth compressor modulation



The above weighting factors are defined for an average European Climate Profile and an average building load representative of residential applications.



Most of the time the units are required to operate at part load conditions. (Ref. prEN 14825 for water chiller)

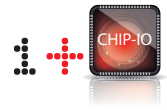


Solutions for better HVAC/R system efficiency

pCO5+: one response to the multiple current and future demands of the HVAC/R market

The pCO5+ controller offers specific new functions for improvising the efficiency of HVAC/R systems:

- **Flexibility:** Up to 10 universal channels, each configurable as an input or output. Carel has developed a proprietary chip using ASIC technology (Application-Specific Integrated Circuit), ensuring greater system flexibility as manufacturers can use the same size board for different applications
- **Connectivity:** Up to 7 communication ports available, with the most commonly-used protocols in HVAC/R applications, for complete system management: pLAN, 1 BMS1, BMS2, FieldBus1, FieldBus2, USB host, USB device.
- **Energy Saving:** Up to 2 integrated EVDEVO drivers for managing two Independent E^{X}V electronic expansion valves, meaning less wiring and space occupied. The Ultracap module can also be installed without increasing the physical dimensions of the pCO^{5}+. The Ultracap module, exploiting ELDC (Electric Double Layer Capacitor) technology, represents a fast, reliable and environmentally-friendly solution for closing the electronic expansion valve in the event of power failures.
- **Cloud based:** Possibility to perform actions via web, such as read and write unit variables, update the application on the board, and Webserver to browse custom HTML pages, send emails.
- **Backward compatibility:** pCO^{5}+ is compatible with the two previous generations of the pCO family



I/O Flexibility
Up to 10 channels, congurable as Input or Output.

Connectivity
Up to 7 communication ports.

Energy Saving
Up to 2 built-in EXV drivers for managing two EXVs with Ultracap module.

Cloud based
Centralized monitoring service for real time data access historical trends and alarm notications.

Backward compatibility
Hardware & software compatible with previous 2 generations of pCO: pCO5 and pCO3.

display the data and set
most suitable parameters
according to the different

Simpler and more intuitive human-machine interaction

Scalability
The right solution to cover all customer requirements.

Advanced aesthetics
Alpha blending technology, High resolution images, vectorial le management, …

Connectivity
Up to 4 communication ports via RS485 or TCP/IP with Modbus® and Bacnet™ protocols.

Graphic Library
HVAC/R Library: CAREL knowledge oered to customers.

Service
History trends, embedded datalogger and remote connectivity.

The new pGD Touch range has been designed for high level applications that require touchscreen technology combined with an elegant design and extensive connectivity possibilities.
pGDTouch is available in a wide range of versions, which differ as regards display size and connectivity, so as to meet all HVAC/R application requirements.

The range includes four different models:
- 4.3" 480x272 (WVGA);
- 7.0" 800x480 (WVGA);
- 10.4" 640x480 (VGA);
- 13.3" 1280x800 (WVGA).

pGD Touch manages the most commonly-used serial communication protocols in the HVAC/R market (Modbus®, BACnet™) and as a result, can connect to and control not only CAREL products, but also third party devices. Remote connection is guaranteed by the Ethernet port, for simple and fast site service management.

Customisation of the user interface is faster and more intuitive thanks to the new 1tool Touch Editor, containing a library of standard graphic objects, a constantly updated library of components used in HVAC/R and set of templates that can be used as the starting point for developing new applications.

Simpler, more intuitive and attractive interfaces for the end user

The 1tool Touch Editor engine is based on QT libraries. QT is a multi-platform library for the development of programs with graphic interfaces using widgets. QT is one of the most commonly-used standards around the world.

Solution for commercial application

Complete solution for climate control ensuring the high efficiency of the units to minimize the power consumption and environmental impact.

Air conditioning represents the process that enables and maintains specific temperature conditions, relative humidity and indoor air purity.
Over and above outdoor conditions, this process enables, via the control of four variables, (temperature, humidity, movement and air quality), the hygroscopic wellness for the occupants of a specific environment.
In commercial buildings, there are two solutions to achieve such wellness : hydronic systems and air to air systems.
In hydronic systems, water is used as an heat exchange fluid.
The machines producing hot or cold water to provide comfort are called chillers.
Beside the chiller units, there are the hydronic terminals (fan coils) and an air treatment unit that heat and chill the ecah environment managing air quality.

On the other hand, the fluid used for the heat transfer in air to air systems is the air.
The machines used in this type of systems are the air handling units and the roof-tops.
The latter are also called packaged units because they come in a single machine comprising the refrigerant circuit and the air treatment control.

CAREL's offer for regulation in commercial applications is based on programmable controllers, scalable in terms of inputs/outputs depending on the application to manage and have a full range of accessories such as displays, sensors and options as communication modules that can offer a reliable, yet flexible solution, to respond to various needs.
An important aspect regarding the commercial buildings is the high consumption of electrical energy.
For this reason, another distinctive feature of CAREL offer is the continuous technological innovation to integrate into your own system, high-efficiency devices such as electronic expansion valve, and drivers for brushless variable speed compressors, which are elements of fundamental importance for achieving high energy efficiency applications in the tertiary sector and minimizing the environmental impact.

Complete range of electronic valves per HVAC/R applications

exv sistema
Electronic Expansion Valve

With E^{X}V sistema CAREL offers a complete and integrated solution for controlling evaporation temperature in air-conditioning and refrigeration units, through the E^{X}V electronic expansion valves and the new EVD evolution superheat controller.
This solution is the result of decades of experience in the specific application, and thanks to the new EVD evolution driver, it integrates perfectly into the series of CAREL controllers for the optimised management of the complete refrigeration cycle.
The range of electronic expansion valves offered by CAREL covers cooling capacities up to 2000 kW, thanks to the new E^{7}V series. All CAREL valves share the same technological solutions, from the larger sizes (E^{5}V, E^{6}V, E^{7}V) to the high-end solution for 40 kW (E^{2}V smart).
Electronic valves optimise flow in the refrigerant circuit in all operating conditions. As a result, significant energy savings can be achieved by installing these valves

Energy savings

Operation at minimum possible condensing pressure means less work performed by the compressor, and a consequent reduction in energy consumption.

Easy to use

Quick start with just 4 settings, graphic display with help on the parameters, easy driver and valve installation and maintenance.

CO_2 Ready

CAREL control systems and EXV valves can manage both subcritical and transcritical CO_2 cycles.

-14.3%
in supermarket applications energy demand

-30%
possible energy savings in the chiller applications electrical consumption

EEV Selection

EEV Selection is the application developed by CAREL to quickly and easily select the correct electronic expansion valve size both for A/C and retail applications.
From work temperature data to heating/cooling capacity data, the application calculates the valve size that meets the builder's needs.
The algorithm that performs the calculations is developed based on CAREL's experience in various application fields.
The app is available in both the International Metric System (SI) and the Imperial system.

Flexible and intuitive energy saving solutions for air handling units

Integrated air handling unit control solutions based on programmable controllers and a complete range of accessories.

Air handling unit applications feature a very wide variety of system types, with differing degrees of specificity. CAREL can supply solutions for all installations, whatever their complexity: modular controllers, a wide range of humidifiers and accessories to ensure increased integration, up to complete system supervision so as to ensure total reliability and maximum energy saving. The system approach is combined with flexibility, both in relation to hardware, i.e. architecture and components, and software, starting with the standard application dedicated to AHUs, completely customisable using 1tool.

- Flexibility: Standard, modular and configurable solutions to adapt to the widest variety of needs.
- Intuitiveness: The graphic interfaces are easy to navigate and provide immediate access to information.
- Customisation: Programmable controllers ensure maximum customisation both in terms of control and user
- Energy saving: Controllers, accessories and management algorithms designed to achieve maximum energy saving interface
- Fieldbus: System solution based on serial integration of devices: optimised management of a higher quantity of information
- Connectivity: Programmable controllers with plug-in options for communication with the most commonly-used BMS systems.

The evaporative cooling simulator on show at the exhibition demonstrates the CAREL solution for "green" AHU using humiFog multizone.

Evaporative Cooling
a new technology based on a natural principle

CAREL has published a new book: "Evaporative Cooling".

Evaporative cooling is a green technique for reducing the electric energy consumption of cooling equipments (dry cooler, chillers, etc.) yet maintaining the capability of the whole cooling system of abating the heat gains.

Cooling is partially/fully achieved by exploiting the spontaneous evaporation of water in the air: in fact, when 1 kg of water evaporates in 1 hour, it absorbs approx. 700 W from the surrounding air (1 lb of water evaporating in 1 hour absorbs approx. 1,100 BTU/hr from the surrounding air). When water evaporation is triggered through a device that consumes a small amount of energy, then that evaporative-cooling device becomes greener than an equivalent, traditional cooling equipment, like a dry cooler or a chiller. For instance, there are products like our humiFog that use as low as 5 Welectric per (L/hr) of sprayed water to generate around 700 W of cooling out of each (L/hr) of sprayed water: the ratio cooling power/input power is as good as 140:1 (= 700/5 in SI); in IP this becomes 485:1 (BTU/hr)/Welectric (5 Welectric per (L/hr) = 2.3 Welectric per (lbs/hr) è 1,100 / 2.3 = 485:1)!
Our book on evaporative cooling addresses both the physical and application aspects of this green technique, which is becoming more and more frequent for comfort cooling, data centres, abating heat gains in printing facilities, textile factories and everywhere where water evaporation can be used for doing cooling. The last chapter of the book also reports some stories that have become success thanks to evaporative cooling.

The book is currently already available in Italian and English; it is being translated into Russian, German, Spanish and French and, upon request and availability, also into other languages.

Evaporative Cooling" follows the book "Air humidification", published a few years ago. Ever since the company was founded in 1973, CAREL has stood out as a company at the cutting edge in the research and development of new technological solutions in the air-conditioning and refrigeration sectors.
As a result of our investments and above all the people we have chosen as our partners, we have become the leading company in Italy, and one of the first three in the world, in the production of humidifiers: a major player that today offers its detailed knowledge and experience accumulated over years of research, collected and organised in a book dedicated to air humidification.
Despite the complexity of the subject matter, on browsing the index it is immediately clear how this guide is practical and complete, set out into independent chapters that can be read separately, according to whether the reader's interest is in theoretical or practical topics. Furthermore, it represents a means for promoting the scientific awareness of the topic that can resolve any doubt or confusion.
This work is aimed above all at designers, providing them a valid source of in-depth information on all aspects of air humidification.
Scientific knowledge of ambient humidity and the instruments used to control it is essential in many industrial processes and, moreover, helps improve personal well-being in the work environment and, in general, the quality of life.
The book is distributed free-of-charge to designers and consultants during the Humidification system meetings organised by CAREL.

humiSonic

Ensuring comfort in every environment

Ultrasound humidification requires 90% less power consumption in comparison to steam generation.

humiSonic is the new ultrasound humidifer developed by Carel It was designed to regulate and keep the desired level of humidity for a specific room at a constant level.
humiSonic, installed inside the fan coils, is the ideal solution to combine ordinary temperature control (guaranteed by the fan coils) with carefully controlled humidity.
The combination and precise regulation of these two fundamental air characteristics ensure that comfort conditions are achieved and maintained in domestic and commercial environments.

Thanks to the high frequency vibrations of the piezoelectric oscillator (1.7 MHZ), humiSonic is capable of producing extremely fine droplets with a diameter of about 1-5 µm.
The forced channelling system installed between the battery and the air outlet nozzle easily and uniformly distributes the atomised water in the fan coil outlet channel.
Providing humiSonic with the humidity probe and flow detector (TAM) creates a complete solution capable of autonomous operation.

Advantages

- significant power savings;
- easy installation and maintenance;
- Sure and guaranteed hygiene;
- accurate environment humidity control.

Climate

Nine Apps all-in-one.
As a matter of fact, Climate is a collection of 9 utilities dedicated to Humidification: AIR, MIX, HUMIDIFICATION LOAD 1, HUMIDIFICATION LOAD 2, DEC, IEC, DEC + IEC, EVAPORATIVE COOLING and CONDITIONS IN AHU/DUCT AFTER THE HUMIDIFIER.
Simple and intuitive, an app essential for industrial designers and not only.
Climate works either in the international metric system (SI) or the imperial one..

Atomiser for evaporative cooling

optiMist is an evaporative humidifier and cooler that atomises water into very small droplets which, by evaporating spontaneously, extract heat from the humidified and cooled air. It uses an impeller pump to pressurise the water, atomising it successively through special nozzles.

The sophisticated control system combines the action of an inverter, which controls speed and therefore pump displacement, with that of 2 solenoid valves that activate only the nozzles necessary. This allows the system to always work at the best pressure for atomising the water, within a wide flow rate range.
The cooling effect of the air is due to the spontaneous evaporation of the water droplets: the change of state from liquid to vapour takes place at the expense of the energy in the air, which cools down as a consequence.

optiMist is a complete system, which includes humidification and evaporative cooling in a unique solution, which can be used to handle air in an AHU (air handling unit), and to humidify the flow air (direct evaporative cooling) and also for indirect cooling of fresh air for example with a crossed flow recovery unit, in a way to increase energy efficiency of the AHU.

optiMist guarantees real energy savings, assuring a very low pressure drop at the fans.

High System efficiency and Best Control

powersolution

Carel Power Solutions is the new Carel proposal to add value to finished products, integrating control solutions already available on the market for optimum use in the field. This ensures best customer service and maximum satisfaction, through an integrated product supplied by just one leading brand, which has always been synonymous with reliability, expertise, flexibility, innovation and service.

Refrigeration&Retail

EEV control unit, fitted with driver and backup battery module. Ideal for both retrofits and new installations.

Air-conditioning

Masteraria

Control unit for air handling units with up to 2 fans, pCO5 controller on terminal block, graphic display on door, case with IP65 degree of protection.

Climate/Humidification

Remote control for CAREL humidifiers. Supplied with cables and pre-wired accessories, can be customised based on the application.

Compressor racks

Module for cold room management fitted with latest generation pRack controller. In addition to compressors, it controls condensers and the complete chain of safety devices.
Vast series of models available for different capacity ranges.

Cold rooms

Cold room controller fitted with MPXPRO and E²V electronic expansion valve. Supernode with WEB card integrated for monitoring and supervision of energy consumption via energy meter.

Cabinets/retail powerBox

Compact control module for refrigerated cabinets.
Modular plug&play solution that optimises and reduces installation time.

CAREL's product catalogues are now also available on CD-ROM.

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